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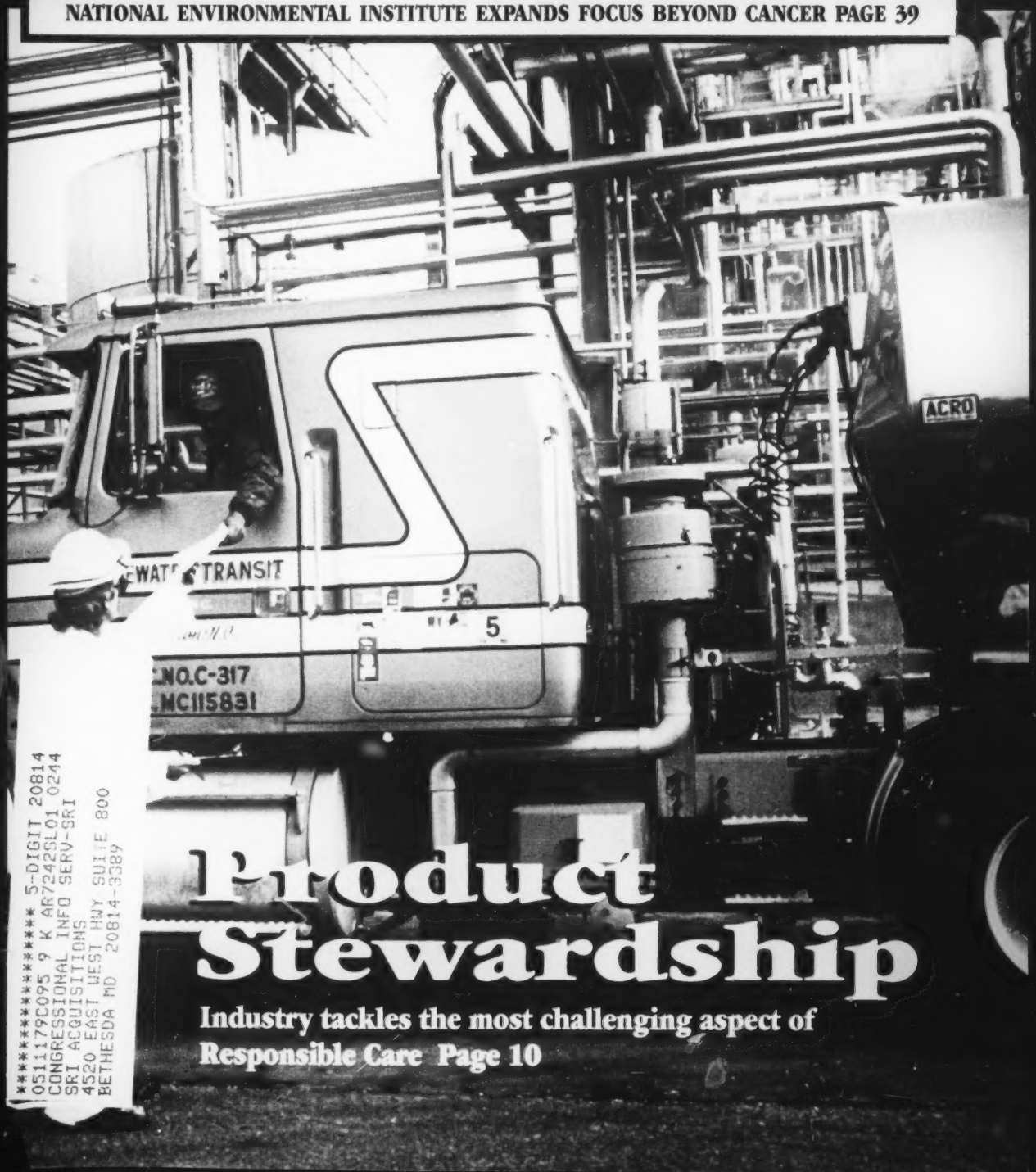
CHEMICAL & ENGINEERING NEWS

C&EN

OCTOBER 17, 1994

NATIONAL ENVIRONMENTAL INSTITUTE EXPANDS FOCUS BEYOND CANCER PAGE 39



Product Stewardship

Industry tackles the most challenging aspect of Responsible Care Page 10

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CHEMICAL & ENGINEERING NEWS

C&EN

OCTOBER 17, 1994

NEWS OF THE WEEK

■ George Olah wins Nobel Prize in Chemistry for pioneering research on carbocations; Alfred Gilman and Martin Rodbell share the Nobel Prize for Physiology or Medicine for work on G-proteins. **Page 4**

■ To settle a suit filed by environmental groups, EPA agrees to consider a ban on 36 carcinogenic pesticides under the Delaney clause; industry says outcome is far from certain. **Page 5**

■ Congress adjourns for election campaign, letting many environmental and other bills die. **Page 6**

■ The Society of Toxicology criticizes an Administration proposal to ban chlorine as simplistic and unmindful of toxicologic principles governing risk assessment. **Page 6**

■ After four years orbiting and doing detailed studies of Venus, NASA spacecraft Magellan does a final experiment and takes a fatal dive into the planet's atmosphere. **Page 7**

■ Eastman Kodak will pay penalties of $8 million for violating hazardous waste regulations and will spend tens of millions of dollars more to clean up its facilities in Rochester, N.Y. **Page 7**

COVER: An employee transfers documentation at a hazardous waste treatment facility. Photo courtesy of DuPont

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BUSINESS

Chemical industry executives from around the globe affirm the cost-cutting measures that have been taken and consider ways to deal with economic cycles, structural problems. **Page 35**

Corporate America's role in science education reform is growing and becoming more organized and systemic. **Page 36**

GOVERNMENT

National Institute of Environmental Health Sciences—a lesser known branch of NIH—expands the range of health effects it studies from environmental exposures beyond cancer. **Page 39**

The 1995 federal budgets approved by Congress provide no overall increase in funding for R&D agencies, but NSF and NIST receive double-digit increases. **Page 44**

SCIENCE POLICY

Comprehensive industrial competitiveness policy issued by the European Union aims for member nations to better compete with the high-tech economies of the U.S. and Japan. **Page 46**

SCIENCE/TECHNOLOGY

The wreck of the *Titanic* is providing an important laboratory setting for scientists to explore marine chemistry and how chemical techniques can help conserve artifacts. **Page 49**

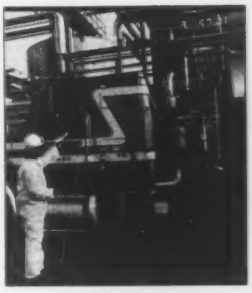
National High Magnetic Field Laboratory is formally dedicated at Florida State University in Tallahassee. **Page 52**

Organoselenium compounds that occur in low concentrations in onion and garlic have been positively identified. **Page 53**

AWARDS

ACS award winners for 1995: Comisarow, Marshall, Darensbourg, Eckert, Eiiel, Engel, Fisher, Ghadiri, Grubbs, Halpern, Jencks, and Kennedy. **Page 66**

NEWS FOCUS



Product stewardship—the last Responsible Care code—challenges chemical manufacturers to work with customers and other third parties to ensure that products are handled and used safely from inception to disposal. Page 10

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LETTERS

A close look at grain ethanol

I would like to comment on the article by Deborah Illman, "Renewable Energy Lab Dedicates Ethanol Plant" (C&EN, Aug. 15, page 37). The article states that the lab will play a critical role in bringing homegrown transportation fuel produced from biomass to the U.S. marketplaces. We already have an example: grain ethanol is mandated by the Environmental Protection Agency to be in our fuels in areas of the U.S. with high carbon monoxide levels.

The following points should be noted:

- Ten percent by volume of ethanol in gasoline increases the normal vapor pressure of the gasoline by about 15%. These emissions are very reactive and easily form ozone.
- Grain ethanol, unlike ethanol made in a refinery from ethylene and water, cannot compete in the fuel market and must be subsidized. In a letter to EPA Administrator Carol Browner, California EPA administrator J. R. Strock stated that the subsidy for grain ethanol is about 54 cents per gal and will cost Californians about $60 million per year. The subsidy is paid by waiving gasoline taxes on bridges and roads, and will result in a tax increase equal to the subsidy.
- The argument that grain alcohol is a renewable fuel ignores the total energy cycle required to produce grain alcohol. The energy cycle involves the production and transportation of fertilizer, application of the fertilizer, tilling the soil, harvesting the corn, gleaning cornstarch from the corn, converting cornstarch to a sugar (yeast will not ferment cornstarch, a complex carbohydrate), and distillation of the dilute alcohol to provide 100% ethanol. All of the procedures require nonrenewable (fossil) energy greater than the renewable energy of ethanol. Similarly, more nonrenewable carbon dioxide than renewable carbon dioxide results from the energy cycle.
- Because of the undesirable properties of ethanol as a fuel, most refiners will opt to produce ethyl *tert*-butyl ether from ethanol plus isobutene. This compound, because of the subsidy, will still cost California drivers $60 million more per year than the present use of methyl *tert*-butyl ether, which does not require a methyl alcohol subsidy.
- It must be emphasized that the EPA regulation requires grain alcohol. As any chemist knows, there is no chemical difference between grain alcohol and ethanol made by chemical synthesis at a fraction of the cost.
- The argument that grain alcohol is a renewable fuel that does not increase the carbon dioxide content of the atmosphere when it is burned does not hold if the total energy cycle to form grain alcohol is included. It is abundantly clear that there is no technical argument for mandating the use of grain alcohol in our fuel supply. It is purely a political gesture toward the corn growers and Archer Daniels Midland—a mammoth conglomerate that makes grain alcohol from corn.

It is most disappointing that EPA would promulgate a regulation that financially penalizes the public and does nothing for clean air.

Alvin S. Gordon
University of California, San Diego
La Jolla

Drugs are medicine

I've been trying to get out word about this for months. The threat by the Food & Drug Administration (FDA) to regulate common tobacco products as drugs is nothing more than a public relations bluff.

It is very well established in case and administrative law that in federal law (literal reading of statutes aside) "drug" means "medicine." Materials intended only for "getting high," for example, are not drugs. The federal regulation concerning use of peyote in ceremonies of the Native American Church refers to this as "nondrug use." FDA and courts have said repeatedly that cigarettes sold for "smoking pleasure" are not drugs. Tobacco products would be drugs only if they made medical claims.

The nicotine patch and gum are drugs only because they claim to treat the "disease" of tobacco "addiction." By licensing the claims of these smoking cessation aids, FDA has for several years indicated that nicotine and tobacco "dependence" exist. The recent advisory panel's conclusion on this subject is therefore pure public relations. Anyway, dependence and addiction have no bearing on whether an article is a drug.

Robert M. Goodman
Bronx, N.Y.

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Industry Executives Seek New Ways To Cope With Business Cycles

■ ***Conference charts slow return of worldwide chemical industry into prosperity, airs concerns about restructuring***

For this year's European meeting of the London-based Society of Chemical Industry (SCI), held earlier this month in Budapest, top management delegates from countries as diverse as Hungary and Japan pondered the future of their industry, even beyond the boundaries of their own countries. One of the main conclusions: Innovative ways must be found to cope with economic cycles and to overcome fundamental structural problems that have been developing during the past decade.

As Peter Vogtländer, chemicals coordinator for Anglo-Dutch giant Shell International Chemical Co., put it in opening the conference, during the past year, companies in the European chemical industry "have cut costs and reduced manpower. There is no question that this has improved our competitive position, but in the majority of cases, it did not move our European operations to the top of the world competitive league table."

Moreover, "most of us did at least some cleaning up of our portfolio and exited from businesses in which we did not have much hope to be a successful player. We closed some capacity but fell far short of what was required. We have made less progress in this area than we should have," he says.

For the transition countries of Central and Eastern Europe, there continues to be little choice in the need to make hard decisions on the road to market economies, according to Gyorgy Szapáry, deputy president of the National Bank of Hungary.

"We have to produce goods that are salable on the international market—we have to be competitive. We must restructure services, industries, and everything else to ensure competitiveness," he says.

C&EN staff photo

Tashiro: high tech does not mean high profit

Such restructuring efforts have led, he says, to a big decline in output. That decline, combined with the collapse of traditional markets in the former Soviet Union, has led to a decline in all Eastern European economies: in Hungary by somewhat more than 20% over the years 1990 to 1993 and even more in other countries.

However, since the first quarter of 1993, production has started to increase. According to Szapáry, a typical pattern exists: decline with "constructive destruction," after which new investment takes hold and production picks up. Hungary has now moved about half of its gross domestic product into the private sector, he says. "There is still a lot to do, but much has been accomplished," and privatization remains high on the government's agenda.

A case in point is the decision, announced in September, to partially privatize Richter Gedeon, the country's largest pharmaceutical company. It is one of Hungary's top five exporters, with exports of $67.3 million in first-half 1994. Total sales during first-half 1994 were $112 million, and pretax profits were $27 million. The government currently holds 87% of Richter; the remaining 13% is held by various other interests, including employees.

"Hungary's government has decided to do all these things—it is committed to them," says Szapáry. "We are condemned to succeed—there is no alternative."

In contrast to the problems of the transition countries, those of the Japanese chemical industry mirror closely those of the Western European industry. However, Japan's industry has an additional complicating factor: the close proximity of the Asian "tiger" economies, including China, says Madoka Tashiro, president and chief executive officer of Tosoh Corp., of Tokyo.

The chemical industry in the U.S. is already well on its way to a full recovery, he says. The basis of a recovery is starting to appear in Europe, and Asia is showing signs of economic activity "to the point of overheating. Only in Japan is the situation getting worse, or at least it has been so until quite recently. For example, the results before taxes of eight of the major [Japanese]

Too many product grades hurt Japan

Number of grades	Japan	U.S.	Europe	Korea	Taiwan	Saudi Arabia
Polyethylene, low density	2,500	300	500	200	60	4
Polyethylene, high density	1,000	150	150	100	30	5
Polypropylene	6,000	300	500	150	60	0

Source: Japanese Ministry for International Trade & Industry survey

chemical companies in fiscal 1993 were all in the red, amounting to a combined loss of $800 million," Tashiro adds.

Prices have fallen over the past several years, but costs have not dropped commensurately. In fact, because the structure for costs such as personnel, R&D, maintenance, depreciation, interest, and environmental protection has not changed greatly, the appreciation of the yen means that costs have substantially increased compared with international levels.

"The second problem is one of our own doing and deals with high costs brought about by differentiation and diversification which prevailed in the 1980s," Tashiro says.

"Differentiation was attempted by creating numerous customer grades for even a commodity-type product and then producing only small quantities of each grade. This is especially true for plastic resins. Obviously, this led to lower productivity and also increased R&D costs," he notes.

A similar situation occurred in the area of diversification, he suggests. Electronics, biotechnology, and new products became the key words for the industry. "This naturally pushed up R&D costs significantly," he says. "The industry learned the hard way that high tech does not necessarily mean high profit or high return but does mean high costs and high risks."

Tashiro says that Japanese chemical companies are starting to focus or refocus their efforts on their core business areas where they have a clear, competitive position worldwide. And the chemical industry, along with many others in Japan, is also reevaluating its employment system. "This may not sound like anything particularly new to you, but this is a high challenge for Japan," he points out.

Whether in Japan or in Central and Eastern Europe or in Western Europe, the danger is that once negative pressures to restructure dissipate, efforts to do so will disappear as well. As Vogtländer puts it: "If [restructuring] was too difficult during the bad times, will it be any easier during the better times? Will all the good intentions forged in the fires of a crisis lose their mettle now the immediate danger is past?" A strong future for the chemical industry will depend upon those good intentions coming to pass.

Patricia Layman

Firms urged to commit to education reform

Increasingly, corporate America has been moving toward greater support of science education programs. Its motivation is both altruistic—concern about the effectiveness, or lack thereof, of U.S. science education—and self-interested—the need to increase scientific literacy and ensure a future supply of well-trained scientists and technicians. Now, that support is reaching down as far as the elementary school level.

As a means to help companies assess the effectiveness of their own programs and to develop strategies for reforming science education, the National Science Resources Center (NSRC) late last month sponsored a one-day meeting entitled "Corporate America's Impact on Elementary Science Education." NSRC is a joint effort of the National Academy of Sciences and the Smithsonian Institution aimed at systemic reform in science education, rather than "quick-fix" or piecemeal approaches.

Hosted by Merck, at its new headquarters in northwestern New Jersey, representatives from more than 70 companies—including more than 25 pharmaceutical and chemical producers—discussed the need for reforming science education, philosophies and plans for how that reform might be accomplished more consistently, and examples of existing corporate initiatives. In addition to many high-technology companies, the participants also included representatives from educational associations and foundations and from organizations such as the National Academy of Sciences, the Department of Education, and the National Research Council.

C&EN staff photo

NSRC's Shuler addresses corporate representatives on science education.

Offering examples from their own experiences were NSRC's corporate collaborators and sponsors—Bristol-Myers Squibb, Dow Chemical, Hewlett-Packard, Miles Inc., and Merck—in a panel discussion mediated by Sally Goetz Shuler, deputy director of NSRC. Merck, like many firms, initially supported higher education by funding graduate students and postdoctoral fellows, explains P. Roy Vagelos, Merck's chairman who retires Oct. 31. But recognizing that the number of people entering the pipeline was decreasing, the company has shifted the focus to earlier education to "avoid losing people early on," he adds.

The company set up the Merck Institute for Science Education in 1993. It has a minimum 10-year, $20 million commitment from Merck and is supporting numerous local community programs. "We've done many things, but we wonder how effective we are," says Vagelos, referring both to Merck and general industry efforts. "A national focus that truly identifies those areas that can be productive in teaching young people science and math would be a tremendous contribution to the U.S."

Although committed to improving the quality of science education, many companies stress the need to justify their involvement and expenditures for education. This often means gaining critical corporate management support and demonstrating that money is being spent wisely. "Philanthropy and business is business," comments Sande Deitch, executive director of the Miles Inc. Foundation at chemicals and pharmaceuticals producer Miles. "Corporations do not give money away for nothing; we're just not the shining knights."

In the short term, philanthropic efforts are a good way to get a company's name out in a positive way, but in the long term, companies depend on a skilled work force and a scientifically literate public. Miles has developed collaborative partnerships with 28 school dis-

Research generally fares poorly in '95 budgets, but NSF, NIST buck trend

Janice R. Long, C&EN Washington

The 103rd Congress managed to accomplish at least one task on time and under budget before it adjourned for the '94 fall campaign season. It enacted all 13 of the appropriations bills needed to keep the federal government operating, and it did so before fiscal-year 1995 began on Oct. 1.

Such promptness didn't translate into good news for the research community, however. Overall, Congress provided a zero budget increase for the federal agencies that fund R&D, in the process cutting President Bill Clinton's R&D budget request 1% to $79.6 billion. Nevertheless, Congress, particularly members of the House and Senate Appropriations Committees, managed, as usual, to find enough money to fund a number of specific academic research projects and programs, to the tune of tens of millions of dollars.

The Department of Defense's fiscal 1995 appropriations bill, H.R. 4650, has its share of such academic pork, at least $140 million worth as Rep. George E. Brown Jr. (D.-Calif.) pointed out during floor consideration of the House-Senate conference report on the bill. About 90% of that $140 million goes to academic projects in districts or states represented by members of the appropriations committees. Still, he admits that $140 million in identifiable earmarks represents significant progress over last year. DOD's fiscal 1994 appropriations bill contained approximately $275 million in earmarks. In addition, Brown notes, there are another eight projects worth almost $43 million that are probably going to academic institutions.

Among this year's earmarked projects are $15 million for the Tulane/Xavier Center for Bioenvironmental Research in New Orleans, a city represented by Sen. J. Bennett Johnston (D.-La.), chairman of the Appropriations Subcommittee on Energy & Water Development. (The center bears Johnston's name.) Three other Louisiana projects split $2.25 million. Hawaii, whose senior Senator, Democrat Daniel K. Inouye, chairs the Appropriations Subcommittee on Defense, fared even better. Six earmarked projects within its boundaries receive a total of $42 million. Pennsylvania, which is the home state of Inouye's House counterpart, Democrat John P. Murtha, is the recipient of four earmarked projects worth just $6 million.

Altogether H.R. 4650 provides just under $36 billion for DOD research, development, test, and evaluation programs in fiscal 1995. That amount represents a 3% increase over fiscal 1994 levels, but is 1% less than the Administration had requested. However, conferees on the bill then took back some of what they had given, directing DOD to cut $200 million from the amount just provided for support of university research programs—about $1.8 billion. The House earlier had cut the university research account by $900 million, or 50%, so a truly draconian cut was avoided.

Also on the academic front, the conference report on H.R. 4650 said, "The conferees are concerned about overhead charged by universities to Defense research contracts, particularly the amount the DOD must pay annually to universities for overhead, about $500 million, and the variability of overhead rates applied to each institution's research projects." The conferees told the Secretary of Defense to have ready by Feb. 1, 1995, a report outlining the actions DOD plans to take to address those concerns.

Total funding for the next largest recipient and disburser of federal research funds—the National Institutes of Health—also increased, up 4% to $11.3 billion, including $20 million for the construction of extramural research facilities. Funding for the institutes alone is also up 3% to $10.3 billion, as is funding for the AIDS research research conducted by all of the institutes, which totals $1.3 billion.

Funding for the National Institute of General Medical Sciences (NIGMS), which supports the majority of NIH's chemically related research, is up 3% to $902 million. NIGMS also is getting an additional $3.4 million from the Office of the Director for its minority access to research careers and minority biomedical research support program.

Although the NIH budget is up, Rep. John E. Porter (R.-Ill.), ranking minority member of the Appropriations Subcommittee on Labor, Health & Human Services, Education, and Related Agencies, is concerned that NIH's 4% increase isn't even enough to keep up with inflation. "NIH is a national treasure," Porter told fellow members, but "at this rate, we are going to lose new researchers and miss unprecedented opportunities to improve our health." Expressing similar concern in the Senate, Mark Hatfield of Oregon, ranking minority member of the full Appropriations Committee, says he will press next year for enactment of a new health research fund. Such a fund, financed by a 1% surcharge on private insurance premiums, would increase support for NIH by about 50% or $5 billion annually and would, moreover, provide a predictable, stable source of support.

Congress, for the most part, does not insert academic or any other kind of earmarks into NIH's budget. Conferees may, for example, "strongly encourage" the National Cancer Institute to expand its level of support for both diethylstilbestrol research and education efforts, but that's about as far as it goes.

The National Science Foundation is one of two bright spots in the otherwise dreary federal research budget. Its overall budget is up 11% to $3.4 billion, with funding for research and related activities up 13% to $2.2 billion. And Congress provided it with enough money to make a start on refurbishing the academic research infrastructure with a $250 million appropriation, plus $126 million for purchases of major research equipment. All of NSF's funds are disbursed on the basis of peer review of grant proposals, and Congress made no move to change or constrain that practice.

However, that can't be said of the other programs funded under H.R. 4624, the fiscal 1995 appropriations bill for the Departments of Veterans Affairs, Housing & Urban Development, and sundry independent agencies. When the bill left the House, it contained no earmarks. The Senate approved $135 million worth of earmarks. When the bill emerged from the conference, it contained a total of $290 million for earmarked projects, including more than $100 million worth of academic earmarks. These academic earmarks include 41 projects totaling $68.2 million funded by HUD, 32 projects worth $32 million funded by

Congress freezes overall funds for R&D agencies in '95

$ Millions	1994	1995 Administration request	1995 Congressional appropriation	% difference, appropriation-request	% change 1994–95
Defense	$34,934	$36,225	$35,870	–1%	3%
Air Force	12,259	12,349	12,203	–1	0
Defense agencies	8,710	9,417	9,099	–3	4
Navy	8,301	8,935	8,796	–2	6
Army	5,421	5,260	5,521	5	2
Other	243	264	251	–5	3
NASA	15,621	14,241	14,377	1	–8
Science, aeronautics & technology[a]	5,788	5,901	5,891	0	2
Human space flight[a]	6,672	5,720	5,574	–3	–16
Mission support[a]	2,653	2,663	2,555	–4	–4
Energy	12,749	12,198	11,822	–3	–7
Environmental restoration & waste management	5,899	5,938	5,837	–2	–1
Energy R&D	5,713	5,464	5,208	–5	–9
General science & research	1,615	1,074	984	–8	–39
Superconducting Super Collider termination costs[a]	640	143	0	na	na
Supporting research & technical analyses	976	956	952	0	–2
Materials sciences[a]	277	274	276	1	0
Chemical sciences[a]	169	162	164	1	–3
Waste R&D	687	703	703	0	2
Conservation	392	601	490	–18	25
Biological & environmental research	416	435	445	2	7
Fossil	431	451	443	–2	3
Solar & renewables	347	410	388	–5	12
Fusion	348	373	373	0	7
Nuclear	341	312	293	–6	–14
Environment, safety & health	160	149	137	–8	–14
Weapons R&D—core	1,137	796	777	–2	–32
NIH	10,938	11,472	11,334	–1	4
National institutes	10,001	10,434	10,310	–1	3
General Medical Sciences[a]	876	908	902	–1	3
National Center for Research Resources	332	351	360	3	8
National Center for Human Genome Research	127	152	153	1	20
Other	478	535	511	–4	7
NSF	3,019	3,199	3,360	5	11
Research & related activities	1,994	2,348	2,245	–4	13
Education & human resources	570	586	606	3	6
Major research equipment	—[b]	70	126	80	na
Academic research infrastructure	105	55	250	355	138
Other	350	140	133	–5	–62
USDA	1,416	1,347	1,436	7	1
Agricultural Research Service	728	725	740	2	2
Cooperative State Research Service	495	419	496	8	0
Forest research	193	203	200	–1	4
Commerce	747	1,173	1,049	–11	40
National Institute of Standards & Technology	520	935	790	–16	52
Oceanic & atmospheric research	227	238	259	9	14
EPA extramural R&D	339	364	350	–4	3
TOTAL	$79,763	$80,219	$79,598	–1%	0%

a Funds included in preceding total. b Data not available. na = Not applicable.
Source: Appropriations Committees' conference reports

the VA, $3 million from the National Aeronautics & Space Administration for a regional ecosystem computer-based modeling project at Ohio State University, and $500,000 from the Federal Emergency Management Agency for the University of Nevada, Reno, earthquake engineering center.

Efforts to cancel out the earmarks were unsuccessful in both the House and the Senate. The Senate even defeated an amendment that would merely have required the conference committee to spell out in its report whether earmarked expenditures were contained in the House bill or committee report, the Senate bill or committee report, or were added by the conferees. However, earmarks or not, the bill did increase funding for NASA's science, aeronautics, and technology programs by 2% to $5.9 billion. Funds for the Environmental Protection Agency's extramural research program are up 3% to $350 million.

With its budget set at $790 million, a 52% increase over its fiscal 1994 funding, the Department of Commerce's National Institute of Standards & Technology is the brightest spot in the fiscal 1995 research picture. Funding for NIST's core research programs is set at $265 million, an increase of 17% over fiscal-year 1994. Of that amount, $7 million is for work on environmental technologies and $5 million is for the international trade and standards program.

However, the real growth at NIST is occurring in its outreach programs. Congress provided $431 million—an increase of more than 100%—for the joint NIST-industry Advanced Technology Program and $90.6 million for the Manufacturing Extension Program, a threefold increase. Meanwhile, funding for the National Oceanic & Atmospheric Administration's research programs is also up, but by just 14% to $259 million.

The Department of Agriculture's research budget is up just 1% at $1.4 billion, but the Department of Energy is the only agency whose research budget actually falls in fiscal 1995. Once primarily a research agency, DOE is now spending almost 50% of its $11.8 billion budget on environmental restoration and waste management. Funding for its energy R&D programs is down 9% to $5.2 billion, and funding for its core weapons R&D activities is down 32% to $777 million. □